URBAN IRRIGATION WATER DEMANDS

In order to determine the amount of water that will be necessary for future urban irrigation, components such as population served, irrigable acres, seasonality factors were evaluated. It is assumed that for the year 2020 there will be 100 percent service of reclaimed water for the project area.

Population Projections

Permanent population projections for each service area were developed from a variety of sources including franchise or utility-supplied data. The majority is based on permanent population and does not reflect seasonal variability. Most of the population projections extended through 2020, but for those that did not, a linear regression was performed using the available data. Table 6 presents an estimate of the current serviced and future population projections and the source of information for each service area.

Table 6
Population Projections

Facility/Service Area	Current Serviced Population '99/'00	Projected Serviced Population 2020	Source
Cape Coral Utilities	73,840	166,934 [1]	City of Cape Coral Utility Water Use Permit
North Ft. Myers	50,301	55,764	Lee County Planning Community Web Map
Waterway Estates	7,768	8,603	Lee County Regional Water Supply Authority Update to Water Supply Master Plan 2000-2030
Total	**131,910**	**240,950**	

[1]Based on Water Use Permit irrigation population. Extrapolated using the average population growth of 3.14%, for the period between 2003 and 2019.

Irrigation Water Demands

The urban irrigation water demands were developed using both actual demand data and the modified Blaney-Criddle (B-C) model, provided by the District. The actual demand determined the seasonability factors, while the B-C methodology determined the total annual average demand.

The B-C methodology is explained in Attachment B. The demands were generated for the 1-in-10 year drought event, meaning there is a probability of such a drought occurring once in every ten years. The B-C modeling analysis and results are included in Attachment C. The following input variables were used in the model, to determine the B-C urban irrigation water demands:

- Rainfall Station: Ft. Myers
- Irrigation System: Sprinkler
- Crop: Turf Grass
- Irrigable Acreage: Calculated for each service area

- Soil Type: Lee, 0.8 (based on Figures C-8 and C-4 from the Management of Water Use Permitting Information Manual, Vol. III).

Table 7 presents the 1-in-10 Year Drought Rainfall, which was used to estimate the demand for irrigation along with the irrigable area.

Table 7
1-in-10 Year Drought Rainfall Values (inches)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lee Rainfall Station (in)	1.3	1.7	0.3	0.7	2.9	7.2	6.8	7.4	8.0	2.4	1.2	1.3

The irrigable acreage for each service area was estimated based on two main components;
- Developed Irrigable Acres includes residential and to a lesser extent, commercial. Based on experience in Cape Coral and other reuse systems, a factor of 0.075 irrigable acres per capita was used for the developed areas.
- Open space typically includes golf courses. Open space areas were determined from utility-supplied data, where possible; and were projected using historical golf course acreages from the Lower West Coast Water Supply Plan (2000), when other information could not be found.

The open space irrigable areas were then added to the developed irrigable acreage. The results indicated the total irrigable acreage for each service area. On a percentage basis, this amounted to an irrigable acreage per total acreage of approximately 15 to 20 percent, depending on the service area. This is a realistic percentage for a mixed-use area that has a higher residential coverage, but also includes non-developable coverage, which does not require any significant irrigation needs such as wetlands, surface water, and retail/commercial areas. Tables 8 and 9 present the irrigable acreage used to determine the service area irrigation demands. It is important to note that future water conservation efforts such as Xeriscape^{TM} landscaping, irrigation hours, and other mandatory ordinances may decrease the demand projections displayed here. These factors were not taken into consideration for this analysis.

Table 8
Irrigable Acreage – Current

Facility Inventory	Total Acreage	Developed Irrigable Acreage	Open Space Irrigable Acreage	Total Irrigable Acreage
Cape Coral Utilities	42,670	5,538	1,191	6,729
North Ft. Myers	20,653	3,773	581	4,354
Waterway Estates	3,716	583	103	686
Total	**67,039**	**9,894**	**1,875**	**11,769**

Table 9
Irrigable Acreage – Future (2020)

Facility Inventory	Estimate Future Acreage	Developed Irrigable Acreage	Open Space Irrigable Acreage	Total Irrigable Acreage
Cape Coral Utilities	54,929	11,316	1,902	13,218
North Ft. Myers	25,470	4,182	581	4,763
Waterway Estates	3,716	645	103	748
Total	**84,115**	**16,143**	**2,586**	**18,729**

Table 10 presents the future annual average estimated irrigation demand results from the B-C method model for the current and future scenario. Since it was determined that the B-C method alone does not realistically predict the seasonal irrigation demand, seasonal reuse factors were established using actual recent reuse demands. This ratio was calculated by dividing the monthly annual average daily reuse flow by the annual average daily flow. Table 11 presents the resulting seasonal factors. For certain service areas that did not show an appropriate distribution, factors from another representative service area were used. These factors were then applied to the annual average demand supplied by the B-C model to create future demand projections. The reuse factors described above are included in the methodology for Attachment B.

Table 10
Annual Average Irrigation Demand
From the Blaney-Criddle Model

Utilities	2020 Demand (MG)
Cape Coral	19,600
North Ft. Myers	6,500
Waterway Estates	1,100

Table 11
Seasonal Reuse Factors

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cape Coral	1.00	1.14	0.99	1.08	1.25	0.95	0.81	0.63	0.67	1.04	1.24	1.18
N. Ft. Myers	1.09	0.96	1.10	0.86	0.92	1.03	1.15	1.42	0.78	0.69	0.78	1.21
Waterway Estates	1.00	1.14	0.99	1.08	1.25	0.95	0.81	0.63	0.67	1.04	1.24	1.18

Tables 12 shows the actual current reclaimed water flows. These flows reflect the current irrigation demand for the year 2002 and 2003. The annual average current average demand for the study area is approximately 15.9 MGD. The future demand analysis determined on a temporal basis for each service area using the B-C method and the seasonal factors (explained above) is presented on Table 13. A greater than 300% increase is projected between 2000 and 2020. Taking into consideration the anticipated growth in the region, this estimate appears to be reasonable. The current and future demands are presented geographically in Figures 4 and 5 respectively.

Table 12
Urban Irrigation Demand Analysis – Current

	Actual Irrigation System Demand* (MGD)												Annual Average (MGD)	Annual Total (MGD)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec		
Cape Coral Utilities	22.3	25.4	22.0	24.0	27.9	21.2	17.9	14.1	14.8	23.1	27.7	26.3	22.2	266.7
North Ft. Myers	1.5	1.4	1.5	1.2	1.4	1.0	1.4	1.4	0.2	1.2	0.7	1.6	1.2	14.4
Waterway Estates	0	0	0	0	0	0	0	0	0	0	0	0	-	0
Total Monthly Flow (MGD)	**14.2**	**15.0**	**15.9**	**15.1**	**15.6**	**16.7**	**15.7**	**17.6**	**16.3**	**16.3**	**15.8**	**16.5**	**15.9**	**281.1**

Table 13
Urban Irrigation Demand Analysis – Year 2020

	Normalized Modified Blaney-Criddle Demand (MGD)												Annual Average (MGD)	Annual Total (MGY)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec		
Cape Coral Utilities	53.9	61.3	53.2	58.0	67.3	51.1	43.3	34.1	35.8	55.9	66.8	63.6	53.7	644
North Ft. Myers	19.4	17.0	19.5	15.3	16.2	18.3	20.4	25.2	13.8	12.2	13.8	21.5	17.7	213
Waterway Estates	2.8	3.2	2.8	3.0	3.5	2.7	2.2	1.8	1.9	2.9	3.5	3.3	2.8	33
Total Monthly Flow (MGD)	**76.1**	**81.6**	**75.5**	**76.3**	**87.0**	**72.1**	**66.0**	**61.0**	**51.4**	**71.0**	**84.1**	**88.4**	**74.2**	**890**

* These figures represent calculated values for the year 2020, based on a normalized version of a modified Blaney-Criddle Method.

The demands estimated above were more significant than predicted by the Water Supply Plan. It is clear a variety of alternative sources will be necessary to satisfy these projected irrigation demands and to minimize impacts to other stretched resources, such as groundwater.

LEGEND:

21.7 Annual Average Daily Reclaimed System Demand (MGD)

∧ Coast Line

∧ Major Roads

∧ County Boundary

∧ Subregion Boundary

▮ Water

▮ Cape Coral Utilities

▮ North Fort Myers Utilities

▮ Waterway Estates

Charlotte County
Lee County

41

I 75

1.2

0.0

Caloosahatchee River

22.2

Gulf of Mexico

41

I 75

5   0   5 Miles

FUTURE RECLAIMED WATER SYSTEM DEMAND

LEGEND:

56.1 Annual Average Daily Irrigation Demand (MGD)

Coast Line

Major Roads

County Boundary

Subregion Boundary

Water

Cape Coral Utilities

North Fort Myers Utilities

Waterway Estates

N

Charlotte County
Lee County

17.7

2.8

53.7

Caloosahatchee River

Gulf of Mexico

5   0   5 Miles